

BLACK & VEATCH

South Florida Water Management District
EAA Reservoir A-1 Basis of Design Report

January, 2006

APPENDIX 6-11

COST INFORMATION FOR MODIFICATIONS TO EXISTING PUMP STATIONS

Final BODR Costs										
G-370 Pump Station Mechanical and Miscellaneous Modifications										
	Individual Pump Capacity (cfs)	PS Capacity (cfs)	Pumping Head (ft)	Civil Direct Costs	Civil Indirect Costs	Civil Contingency	Mechanical Direct Costs	Mechanical Indirect Costs	Mechanical Contingency	Total
A <i>No Change</i>	780	2340	8				\$0	\$0	\$0	\$0
B <i>Replace Propeller</i>	340	1020	12				\$1,430,000	\$650,000	\$600,000	\$2,680,000
C <i>Increase Engine and Pump Speed</i>	625	1875	12				\$5,160,000	\$2,330,000	\$2,200,000	\$9,690,000
D <i>Increase Engine and Pump Speed and Replace Impeller</i>	740	2220	12				\$6,020,000	\$2,720,000	\$2,600,000	\$11,340,000
E <i>Increase Engine and Pump Speed and Turbo-Charge Engine</i>	925	2775	12				\$7,440,000	\$3,360,000	\$3,200,000	\$14,000,000
F <i>Increases Engine and Pump Speed, Turbo-Charge Enginer, & Replace Impeller</i>	925	2775	12				\$8,300,000	\$3,750,000	\$3,600,000	\$15,650,000
G-370 Pump Station Civil Modifications										
<i>Pump Discharge Structure</i>				\$6,400,000	\$2,890,000	\$2,800,000				\$12,090,000
<i>Seepage Culvert - 700 lin.ft. - 10' x 10'</i>				\$2,100,000	\$950,000	\$900,000				\$3,950,000
<i>Gate Structure to STA-3/4 Supply Canal</i>				\$3,140,000	\$1,420,000	\$1,400,000				\$5,960,000
<i>Gate Structure to EAA Reservoir A-1</i>				\$3,640,000	\$1,650,000	\$1,600,000				\$6,890,000
<i>Flood Wall (south side) - 550 lin.ft.</i>				\$580,000	\$260,000	\$300,000				\$1,140,000
<i>Flood Wall (north side) - 200 lin.ft.</i>				\$80,000	\$40,000	\$0				\$120,000
<i>Canal Levee Earthwork</i>				\$1,420,000	\$640,000	\$600,000				\$2,660,000
<i>Seepage Pump Modifications (Mechanical & Structural Modifications)</i>				\$450,000	\$200,000	\$200,000				\$850,000
G-372 Pump Station Mechanical and Miscellaneous Modifications										
A <i>No Change</i>	780	3120	8				\$0	\$0	\$0	\$0
B <i>Replace Propeller</i>	340	1360	12				\$1,790,000	\$810,000	\$800,000	\$3,400,000
C <i>Increase Engine and Pump Speed</i>	625	2500	12				\$6,300,000	\$2,850,000	\$2,700,000	\$11,850,000
D <i>Increase Engine and Pump Speed and Replace Impeller</i>	740	2960	12				\$7,450,000	\$3,370,000	\$3,200,000	\$14,020,000
E <i>Increase Engine and Pump Speed and Turbo-Charge Engine</i>	925	3700	12				\$10,020,000	\$4,530,000	\$4,400,000	\$18,950,000
F <i>Increases Engine and Pump Speed, Turbo-Charge Enginer, & Replace Impeller</i>	925	3700	12				\$11,160,000	\$5,050,000	\$4,900,000	\$21,110,000
G-372 Pump Station Civil Modifications										
<i>Pump Discharge Structure</i>				\$8,530,000	\$3,860,000	\$3,700,000				\$16,090,000
<i>Gate Structure to STA-3/4 Supply Canal</i>				\$4,190,000	\$1,890,000	\$1,800,000				\$7,880,000
<i>Gate Structure to EAA Reservoir A-1</i>				\$4,850,000	\$2,190,000	\$2,100,000				\$9,140,000
<i>Canal Levee Earthwork</i>				\$18,340,000	\$4,670,000	\$6,900,000				\$29,910,000
<i>Seepage Pump Modifications (Mechanical & Structural Modifications)</i>				\$600,000	\$270,000	\$300,000				\$1,170,000

BLACK & VEATCH

Central Florida

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Civil Modifications to G-370 Pump Station to Pump to EL 20.6 NAVD88

Probable Construction Cost

July 17, 2005 - NRJ

<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>
Pump Discharge Structure				\$6,400,000
Sheet Piling				
1st cell	11660.0	SF	\$25	\$292,000
2nd cell	11660.0	SF	\$25	\$292,000
3rd cell	4240.0	SF	\$25	\$106,000
			Subtotal	\$690,000
Multiplier for Rock Application			1.5	\$1,035,000
Concrete				
Floor	3608.9	CY	\$460	\$1,660,000
Walls	898.1	CY	\$735	\$660,000
Gate walls	634.0	CY	\$735	\$466,000
Service Bridge	160.0	CY	\$840	\$134,000
Actuator Supports	125.0	CY	\$840	\$105,000
Walkway	75.2	CY	\$840	\$63,000
Metals	1	LS		\$80,000
			Subtotal	\$4,203,000
Multiplier for Working in Water Condition			10%	\$420,300
Gates/Valves				
Flap gates	6.0	EA	\$30,000	\$180,000
Roller gates	9.0	EA	\$150,000	\$1,350,000
Actuators	1	LS		\$100,000
Misc	1	LS		\$50,000
Electrical	1	LS		\$50,000
Seepage Culvert - 700 lin.ft. - 10' x 10'				\$2,100,000
Concrete				
Floor	544.4	CY	\$460	\$250,000
Walls	777.8	CY	\$735	\$572,000
Gate walls	505.6	CY	\$840	\$425,000
Excavation & Backfill				
- 350' long at exist grade elev 26				
- excavate to elev 4 at 20' bottom width				
- laydown slopes at 2:1				
General	18251.9	CY	\$15	\$274,000
- 350' long at exist grade elev 26				
- excavate to elev 4 at 20' bottom width				
- laydown slopes at 2:1				
General	6844.4	CY	\$15	\$103,000
Paving	4000.0	SY	\$55	\$220,000
Miscellaneous	1	LS		\$20,000
Gates/Valves				
Gate Structure	1	LS		\$200,000
Gate	1	LS		\$75,000

EAA Reservoir A-1 Basis of Design Report

January, 2006

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Central Florida

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Civil Modifications to G-370 Pump Station to Pump to EL 20.6 NAVD88

Probable Construction Cost

July 17, 2005 - NRJ

<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>
Gate Structure to STA-3/4 Supply Canal				\$3,140,000
Concrete				
Floor	498.1	CY	\$460	\$229,000
Walls	926.6	CY	\$735	\$681,000
Ogee weir	303.7	CY	\$400	\$121,000
Service Bridge	68.3	CY	\$840	\$57,000
Actuator Supports	87.5	CY	\$840	\$74,000
Walkway	53.1	CY	\$840	\$45,000
Metals	1	EA		\$50,000
Gates/Valves				
Roller gates	6.0	EA	\$150,000	\$900,000
Actuators	1	LS		\$80,000
Miscellaneous	1	LS		\$40,000
Electrical	1	LS		\$50,000
Wingwalls - 400 lin.ft.				
	30000.0	CF	\$25	\$750,000
Excavation & Backfill				
	3333.3	CY	\$20	\$67,000
Gate Structure to EAA Reservoir A-1				\$3,640,000
Costs based on Unit Cost per 10' Bay developed from Gate Structure into STA-3/4 Supply Canal				
	7.0	10' Bays	\$520,000	\$3,640,000
Flood Wall (south side) - 550 lin.ft.				\$580,000
Concrete				
Base	366.7	CY	\$460	\$169,000
Wall	458.3	CY	\$735	\$337,000
Excavation & Backfill				
	1986.1	CY	\$20	\$40,000
Paving				
	566.7	SY	\$55	\$31,000
Flood Wall (north side) - 200 lin.ft.				\$80,000
Concrete				
Base	29.6	CY	\$460	\$14,000
Wall	44.4	CY	\$735	\$33,000
Excavation & Backfill				
	722.2	CY	\$20	\$14,000
Paving				
	366.7	SY	\$55	\$20,000
Canal Levee Earthwork				\$1,420,000
Remove Canal Levee - 500 lin.ft.				

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Civil Modifications to G-370 Pump Station to Pump to EL 20.6 NAVD88

Probable Construction Cost

July 17, 2005 - NRJ

<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Cost</u>
	74388.9	CY	\$12	\$893,000
Block Supply Canal				
Bottom Area @ 30' x 400' =			12000	
Area @ 19.5 NGVD (560' x 60') =			33600	
Area @ 26.0 NGVD (15' x 250') =			3750	
Fill (bottom section)	21111.1	CY	\$20	\$422,000
Fill (upper section)	5464.2	CY	\$20	\$109,000
Seepage Pump Modifications (Mechanical & Structural Modifications)				\$450,000
Concrete				
Backflow Prevention	55.0	CY	\$1,000	\$55,000
Pipe				
36" diameter	2597.7	LB	\$8	\$21,000
Gates/Valves				
Butterfly Valves	3.0	EA	\$25,000	\$75,000
Check Valves	3.0	EA	\$25,000	\$75,000
Temporary Pumping	1.0	LS		\$55,000
Replace Motors & Electric	3.0	EA	\$20,000	\$60,000
Miscellaneous	1.0	LS		\$20,000
Finishes, Hatches, etc.	1.0	LS		\$40,000
Relocate Pipe Discharge	1.0	LS		\$10,000
Controls	1.0	LS		\$20,000
Remove Wall	1.0	LS		\$10,000
Hoist Rail	1.0	LS		\$10,000

South Florida Water Management District Upgrade Costs for Pump Station G-370

11/28/2005

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Option	A	B	C	D	E	F
RPM	720	720	900	900	900	900
Aspiration	Natural	Natural	Natural	Natural	Turbo	Turbo
Propeller	Existing	New	Existing	New	Existing	New
Shaft	Existing	Existing	New	New	New	New
Max Load, bhp	1300	1300	1600	1600	2000	2000

General Conditions & Mobilization

	0	186,000	666,573	779,073	964,548	1,077,048
Total	0	186,000	666,573	779,073	964,548	1,077,048

Pumps

Shafting	0	0	750,000	750,000	750,000	750,000
Propeller	0	960,000	0	750,000	0	750,000
Total	0	960,000	750,000	1,500,000	750,000	1,500,000

Engine

Speed Increase	0	0	11,250	11,250	11,250	11,250
Var. Speed Controls	0	0	75,000	75,000	75,000	75,000
Drive Shaft	0	0	100,000	100,000	140,000	140,000
Turbocharger/Eng. Modifications	0	0	300,000	300,000	1,920,000	1,920,000
Total	0	0	486,250	486,250	2,146,250	2,146,250

Exhaust System

Pipe	0	0	106,500	106,500	112,500	112,500
Pipe Insulation	0	0	14,850	14,850	15,750	15,750
Expansion Joint	0	0	21,000	21,000	21,000	21,000
Silencer	0	0	66,000	66,000	72,000	72,000
Exhaust Support	0	0	0	0	21,600	21,600
Building Exhaust Penetration Mod.	0	0	60,000	60,000	60,000	60,000
Total	0	0	268,350	268,350	302,850	302,850

Auxiliary Skid (Heat Exchangers, Expansion Tank)

SS Flex coolant	0	0	7,200	7,200	7,200	7,200
Jacket Water HX	0	0	22,500	22,500	22,500	22,500
Lube Oil HX	0	0	22,500	22,500	22,500	22,500
Expansion Tank	0	0	4,500	4,500	4,500	4,500
Skid Modifications	0	0	15,120	15,120	15,120	15,120
Total	0	0	71,820	71,820	71,820	71,820

Cooling Water System

Water Pump	0	0	120,000	120,000	120,000	120,000
Pipe	0	0	42,000	42,000	54,000	54,000
Strainers/Filter	0	0	10,000	10,000	10,000	10,000
Total	0	0	172,000	172,000	184,000	184,000

Air Intake

Filters	0	0	45,000	45,000	45,000	45,000
Total	0	0	45,000	45,000	45,000	45,000

Gear Reducer

Gear Reducer	0	0	1,125,000	1,125,000	1,125,000	1,125,000
Pipe	0	0	19,800	19,800	19,800	19,800
Total	0	0	1,144,800	1,144,800	1,144,800	1,144,800

Engine Generator

Engine Generator	0	0	450,000	450,000	450,000	450,000
Exhaust Pipe	0	0	30,000	30,000	30,000	30,000
Exhaust Insulation	0	0	3,600	3,600	3,600	3,600
Silencer (10 inch)	0	0	24,000	24,000	24,000	24,000
Total	0	0	507,600	507,600	507,600	507,600

Fuel System

Daytank	0	0	45,000	45,000	45,000	45,000
Total	0	0	45,000	45,000	45,000	45,000

Lubricating Oil System

Adequate	0	0	0	0	0	0
Total	0	0	0	0	0	0

HVAC Modifications

	0	0	300,000	300,000	500,000	500,000
Total	0	0	300,000	300,000	500,000	500,000

Electrical & Instrumentation

MCC, Wiring, Instrumentation	0	0	198,000	198,000	198,000	198,000
SCADA	0	0	100,000	100,000	100,000	100,000
Total	0	0	298,000	298,000	298,000	298,000

Miscellaneous

Pipe Cleaning	0	0	0	0	80,000	80,000
Painting	0	30,000	100,000	100,000	100,000	100,000
Pipe Supports	0	0	50,000	50,000	50,000	50,000
Structural-Vibration	0	0	0	0	0	0
Building Upgrade	0	250,000	250,000	250,000	250,000	250,000
Total	0	280,000	400,000	400,000	480,000	480,000

Total	0	1,426,000	5,155,393	6,017,893	7,439,868	8,302,368
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South Florida Water Management District Upgrade Costs for Pump Station G-372

11/28/2005
JPG

Option	A	B	C	D	E	F
RPM	720	720	900	900	900	900
Aspiration	Natural	Natural	Natural	Natural	Turbo	Turbo
Propeller	Existing	New	Existing	New	Existing	New
Shaft	Existing	Existing	New	New	New	New
Max Load, bhp	1300	1300	1600	1600	2000	2000

General Conditions & Mobilization

	0	233,520	815,999	965,624	1,300,589	1,450,214
Total	0	233,520	815,999	965,624	1,300,589	1,450,214

Pumps

Shafting	0	0	997,500	997,500	997,500	997,500
Propeller	0	1,276,800	0	997,500	0	997,500
Total	0	1,276,800	997,500	1,995,000	997,500	1,995,000

Engine

Speed Increase	0	0	17,400	17,400	17,400	17,400
Var. Speed Controls	0	0	75,000	75,000	75,000	75,000
Drive Shaft	0	0	100,000	100,000	140,000	140,000
Turbocharger/Eng. Modifications	0	0	0	0	2,880,000	2,880,000
Total	0	0	192,400	192,400	3,112,400	3,112,400

Exhaust System

Pipe	0	0	240,000	240,000	240,000	240,000
Pipe Insulation	0	0	24,000	24,000	24,000	24,000
Expansion Joint	0	0	32,500	32,500	32,500	32,500
Silencer	0	0	99,000	99,000	108,000	108,000
Exhaust Support	0	0	0	0	21,600	21,600
Building Exhaust Penetration Mod.	0	0	60,000	60,000	60,000	60,000
Total	0	0	455,500	455,500	486,100	486,100

Auxiliary Skid (Heat Exchangers, Expansion Tank)

SS Flex coolant	0	0	11,100	11,100	11,100	11,100
Jacket Water HX	0	0	33,900	33,900	33,900	33,900
Lube Oil HX	0	0	33,900	33,900	33,900	33,900
Expansion Tank	0	0	6,750	6,750	6,750	6,750
Skid Modifications	0	0	22,840	22,840	22,840	22,840
Total	0	0	108,490	108,490	108,490	108,490

Cooling Water System

Water Pump	0	0	225,000	225,000	225,000	225,000
Pipe	0	0	114,000	114,000	114,000	114,000
Strainers/Filter	0	0	10,000	10,000	10,000	10,000
Total	0	0	349,000	349,000	349,000	349,000

Air Intake

Filters	0	0	45,000	45,000	45,000	45,000
Total	0	0	45,000	45,000	45,000	45,000

Gear Reducer

Gear Reducer	0	0	1,710,000	1,710,000	1,710,000	1,710,000
Pipe	0	0	54,000	54,000	54,000	54,000
Total	0	0	1,764,000	1,764,000	1,764,000	1,764,000

Engine Generator

Engine Generator	0	0	450,000	450,000	450,000	450,000
Exhaust Pipe	0	0	30,000	30,000	30,000	30,000
Exhaust Insulation	0	0	3,600	3,600	3,600	3,600
Silencer (10 inch)	0	0	24,000	24,000	24,000	24,000
Total	0	0	507,600	507,600	507,600	507,600

Fuel System

Daytank	0	0	67,500	67,500	67,500	67,500
Total	0	0	67,500	67,500	67,500	67,500

Lubricating Oil System

Adequate	0	0	0	0	0	0
Total	0	0	0	0	0	0

HVAC Modifications

	0	0	300,000	300,000	500,000	500,000
Total	0	0	300,000	300,000	500,000	500,000

Electrical & Instrumentation

MCC, Wiring, Instrumentation	0	0	198,000	198,000	198,000	198,000
SCADA	0	0	100,000	100,000	100,000	100,000
Total	0	0	298,000	298,000	298,000	298,000

Miscellaneous

Pipe Cleaning	0	0	0	0	80,000	80,000
Painting	0	30,000	100,000	100,000	100,000	100,000
Pipe Supports	0	0	50,000	50,000	50,000	50,000
Structural-Vibration	0	0	0	0	0	0
Building Upgrade	0	250,000	250,000	250,000	250,000	250,000
Total	0	280,000	400,000	400,000	480,000	480,000

Total

0	1,790,320	6,300,989	7,448,114	10,016,179	11,163,304
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